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IMPORTANT OPUNTIA INSECTS OF THE UNITED STATES: BIOLOGICAL NOTES ON THE MOTH-BORERS (PYRALIDÆ).

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In 1920 the project for the biological control of introduced Opuntias was formally undertaken by the Commonwealth Prickly-pear Board. This project contemplated the introduction to Australia of the natural enemies of prickly-pear occurring in the Americas. During the writer's connection with this work the collecting and rearing of large numbers of the more important cactus insects afforded an opportunity for a general study of their biologies. The necessity of shipping the material intermittently, as well as attention to the bulk rearings, prevented undertaking more detailed biological work.

Because of the economic potentialities of these insects it is thought desirable to record the data secured. The results herein contained represent, for the most part, average conditions observed in breeding stocks and in the field over several years. The present paper deals only with the more destructive representatives of that group of Opuntia insects attacking the joints internally.

MELITARA PRODENIALIS Walker

DESCRIPTIVE

Adult. The adult is a large-bodied, sluggish, gray moth with a wing expanse of slightly more than one inch. The fore wings are marked with irregular transverse vittæ.

Eggs. The eggs are laid one upon another with great precision. The egg-sticks are normally attached to the extreme tips of spines or spinules on the upper part of the plant, being difficult in the field to distinguish from spines. Sticks contain from 20 to 60 eggs, averaging 35. The sticks are usually slightly curved but are often partly coiled. The

individual eggs are so placed that they resemble tiny, thickened discs. They are elliptical, one diameter being 1.0 mm. and the other, 0.9 mm. In length the egg measures 0.5 mm.

Larva. Until about one-fourth grown the larva has a light brown color. Thereafter it assumes a rich, dark blue hue. When full-grown it measures from 30 to 40 mm. in length.

Pupa. The dark brown pupa is enclosed in a very tough silken cocoon, often pure white. The cocoon is somewhat less than one inch in length.

LIFE HISTORY

In summer the eggs hatch in from nine to fifteen days. The small larvæ construct a light web about an areole, or where two joints make contact, and beneath this they feed gregariously. The web quickly becomes strengthened by the addition of excrement and the dried juices of the plant. When about one-fourth grown they enter the joint and continue to feed together, emitting pellets through one or more openings in the sides of the joint. The change of color described above transpires shortly after the larvæ enter the interior of the plant. Normally, they remain within the joints until full-grown. In summer the larval stage extends over from six to eight weeks.

Full-grown larvæ emerge from the joints and spin their cocoons near the affected plant. The cocoons are usually placed in clumps of three or four, as many as fifteen having been taken in one mass. Sometimes they are found beneath fallen, dried joints and near-by rubbish or placed at the base of an adjacent grass clump. In these instances the cocoons are a beautiful, lustrous white. The majority, however, seem to construct their cocoons in the sand just at the base of the plant, and, in these cases, the cocoons have a considerable admixture of sand and other foreign matter. The duration of the pupal condition in summer is approximately one month.

SEASONAL CYCLE

There are three generations annually in the region about Miami, Florida. Adults from the overwintering larvæ

appear during late February and early March. The midsummer adults issue in June. The fall brood of moths emerges in October. There are not, however, such definite generations as would be indicated by the above periods. The dates mentioned show the periods of maximum emergence. It is possible to find in the field at almost any season of the year cocoons and all sizes of larvæ.

HABITS

The adults hang motionless from spines during the day. Mating and oviposition occur at night. This insect is much more exacting than *Olyca junctolineella* as regards conditions requisite for oviposition in cages. Moisture seems to be a most decisive factor. During periods of low relative humidity in the natural range and under normally dry conditions elsewhere, it has been found necessary to sprinkle the cloth of the cages nightly in order to secure more than a few scattered, subnormal egg-sticks.

The gregarious habit of *M. prodenialis* larvæ is the particular feature of this species which makes it so much more destructive to Opuntia than its western relative, *O. junctolineella.* The average number of larvæ found together is about twelve, but as many as twenty-six half-grown larvæ have been taken in a single small joint.

FOOD PLANTS

Melitara prodenialis has been found infesting all of the more common prickly-pears of Florida; namely, *Opuntia austrina, O. drummondii, O. lata,* and *O. keyensis.* These Opuntias are comparatively tender and succulent. Rearing experiments showed that this insect will not survive on the tougher western Opuntias such as *O. lindheimeri* and *O. engelmanni.* In Queensland, laboratory results showed that the larvæ did not prosper on the "common pest pear," *O. inermis,* its texture being somewhat similar to that of the Texas species mentioned. The species of second importance in Queensland, the "Gayndah pear" or "spiny pest pear" (*O. stricta*), being similar texturally to the Florida species, promises to be quite a suitable host for this insect.

INJURY TO PLANT

The entire damage due to *M. prodenialis* is accomplished by the larvæ. They enter the upper joints and, always feeding gregariously, continue downward from joint to joint, finally invading even the subterranean portions of the plant. Infested plants are rapidly hollowed out, and the remaining tissue, together with a certain amount of larval excrement, is quickly oviposited in by certain scavenging diptera (*Volucella esuriens* Fabr., *V. fasciata* Macq., and *Neorondania* sp.). The larvæ of these scavengers are often responsible for considerable extension and aggravation of injury to large plants not completely killed by the primary insect. The effectiveness in Florida of this combination of insects in destroying prickly-pear is abundantly indicated in the field by disheveled lots of dried, whitened, paper-like epidermis on the ground, marking the complete destruction of cactus clumps.

DISTRIBUTION

Melitara prodenialis has been recorded[1] from New Jersey, Mississippi, and Florida. In the latter State the writer has taken it at Miami, Cocoanut Grove, Larkin, West Palm Beach, Palatka, and Gainesville, and on Biscayne Key.

Thus, while the larval habits render this species the most destructive Opuntia insect in the United States, its climatic limitations and the different texture of the western prickly-pears preclude its prospering in our main cactus area.

NATURAL ENEMIES

Undoubtedly the greatest natural handicap to *M. prodenialis* in its habitat obtains through the attack of ants upon full-grown larvæ after emerging from the plant for pupation in or near the ground.

Brachymeria (Chalcis) pedalis (Cresson) is the only parasite observed. The parasitized host larva spins its cocoon normally and completes its transformation. A single adult parasite then emerges from the pupa. This parasite is not at all abundant in Florida and constitutes little or no check upon the moth-borer.

[1] The Principal Cactus Insects of the United States, by Hunter, W. D., Pratt, F. C. & Mitchell, J. D., U. S. D. A., Bur. Ent. Bull. 113, 1912.

MELITARA sp.

Another type of moth-borer was taken in the same pasture at Uvalde, Texas, on three occasions during the summers of 1921 and 1922. Doctor H. G. Dyar, having the opportunity of viewing only a very small number of adults, and in the absence of data upon the immature stages, tentatively indicated its identity as *Melitara prodenialis* Walk.[2] Observations on the appearance and habits of the immature stages suggest that this form is perhaps distinct from that species.

The three-fourths grown larvæ are indistinctly banded, the blue being very pale, and a faint buff suffusion is noticeable over the entire larva. In each instance of collection, from twenty-one to twenty-four larvæ were found living gregariously within the heavy basal joints, excreting through several perforations. The dry pellets were somewhat webbed and hung from the holes in strings from one to three inches long.

Pupation takes place within the chamber excavated by the larvæ. The cocoon is very similar to that of *M. prodenialis,* being slightly larger. Pupation occurred during September.[3]

The adults emerged late in October and lived about one month. The first eggs were laid on November 2. They are deposited in the same fashion as are those of *M. prodenialis* and *O. junctolineella,* but the sticks average many more eggs. All egg-sticks contained from sixty to sixty-five eggs each. The incubation period was approximately four weeks.

A chalcid parasite which emerged from the cocoons was determined by Mr. S. A. Rohwer as *Pareniaca schwarzi* Cwfd.

Unfortunately no further data were secured to establish the identity of this moth-borer. One portion of the larvæ which was shipped to the writer in Australia perished, and the remainder was also lost at Uvalde, Texas, when Mr. E.

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2 I have been informed that additional material of this form has been submitted to Doctor Dyar and he is describing it as a new species.

3 The further notes on this moth-borer were made by Mr. E. Mortensen.

Mortensen changed headquarters to Miami, Florida, for the winter.

Olyca (Melitara) junctolineella (Hulst)

DESCRIPTIVE

Adult. The adult is a grayish moth with a wing expanse of one and one-half inches, being larger and more robust than *Melitara prodenialis.*

Eggs. The eggs are somewhat larger than those of *M. prodenialis* but are arranged in precisely the same manner. The egg-sticks average about twenty-five eggs each. Some sticks have been seen which contained as many as fifty eggs.

Larva. The newly hatched larva is about 7 mm. long and of a dark color with a suggestion of a deep blue hue. When from one-half to two-thirds grown they become banded, blue and white. The full-grown larva measures from 40 to 50 mm. in length and has a diameter about equal to that of the ordinary lead-pencil.

Pupa. The cocoon and pupa closely resemble those of *M. prodenialis,* but are considerably larger.

LIFE HISTORY

The preoviposition period is very brief. Instances were commonly observed where the moths emerged, mated and oviposited within twenty-four hours.

The eggs of the spring brood hatch in from five to twelve days. The small larvæ immediately burrow into the joint, several often entering the same hole. The joint so affected rapidly blackens and falls to the ground in a few days. The larvæ then crawl again upon the plant and enter new joints, thus becoming well distributed over the cactus clump. While the very small larvæ live for a brief period in the same joint, they have separate tunnels and are in no sense gregarious. After the early stages the larvæ are quite solitary, it being rare to find more than one to a joint. Occasionally two have been found infesting the same joint. After adopting the solitary habit the larva remains constantly inside the joint throughout its development. During summer some ten to twelve weeks are passed in the larval condition. When full-grown the larva cuts an exit hole and

crawls to the ground. The cocoon is spun beneath fallen cactus joints or other débris near the base of the plant, or may be placed just below the surface of the soil. The appearance of the cocoon is affected by its location, those spun on the joints being a beautiful white, while those in the ground are mixed with soil. Transformation takes place shortly after completion of the cocoon, and the pupal stage extends over about four weeks. The length of all stages of the fall generation is somewhat longer.

SEASONAL CYCLE

Throughout Southern Texas, *O. junctolineella* has two generations yearly. Thus, during three-fourths of the year the species exists in the larval stage, both the winter and the dry, hot summer being passed in that condition. The periods of emergence and oviposition coincide with the normally rainy months of the spring and fall. At Uvalde, Texas, the spring brood of moths issues during May and early June, the maximum emergence obtaining during late May or early June. These moths produce the summer larvæ which pupate from late August through September. The peak of emergence of the fall moths occurs about the first of October, and these give rise to the overwintering larvæ. The winter larvæ require about five and one-half months to become full-grown. Pupation extends over the latter half of March and through April.

The upsetting of the seasonal cycle by transportation into the opposite seasons of Queensland and the promise of becoming a three-generation species there has been recently recorded.[4]

HABITS

The adults are inactive by day. The usual position is to hang from a spine by the second and third pairs of legs, with the front legs folded close against the head, resembling the palps. Mating and oviposition occur during the night although some few pairs have been noted to remain in copulation during the following forenoon. Many attempts to observe the manner of oviposition were futile.

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[4] Seasonal Adaptation of a Northern Hemisphere Insect to the Southern Hemisphere, by John C. Hamlin, Jl. Ec. Ent., V. 16, No. 5, pp. 420-424, 1923.

The larvæ are quite solitary. Usually only a small number are found in a cactus clump, despite the large number and arrangement of the eggs. Cannibalism, if it occurs at all, is not of sufficient prevalence to account for this condition. In the rearing of huge numbers of individuals, it was necessary to place together large numbers of the larvæ from the moment of hatching until pupation occurred, thus offering an opportunity for the display of cannibalistic tendencies rarely, if ever, obtaining in nature. Despite such conditions there were no indications of cannibalism. The explanation of the condition cited probably lies in the activities of ants as shown elsewhere in this paper.

The rapidity with which a half-grown larva can enter a fresh, solid joint is one of the most remarkable feats of the species. The silicious cuticle is quickly punctured and the larva disappears in an incredibly short time, considering the density of the medium. This is accomplished by the larva passing the pulp immediately through its body.

FOOD PLANTS

During the entire period of the writer's observations the species has been found feeding only in prickly-pear. The favored species are *Opuntia lindheimeri* and *O. engelmanni.* In Queensland the species has prospered, under laboratory conditions, on both *O. inermis* and *O. stricta.*

Prickly-pear plants set up a strong reaction to wounds of any kind. Numbers of instances have been observed in rearing cages where the exuding juices have drowned the larvæ which punctured the epidermis. This condition is much more frequent in cages where, because of crowding, the larvæ are forced to enter new joints many more times during their existence than in the field. Nevertheless, many larvæ perish in this manner under natural conditions. The prickly-pears of the *ficus-indicæ* group show a greater degree of this type of resistance to larvæ of *O. junctolineella* than do the other Opuntias.

CHARACTER OF INJURY

Newly hatched larvæ are responsible for the outright killing of many joints. The summer brood of larvæ, appearing simultaneously with the spring growth of the plant, is

responsible for the destruction of large numbers of the young fruits.

The most reliable indication of injury is the characteristic swelling of the joints in which larvæ are developing. The larva hollows out a chamber and packs excrement in the lower part of the cavity. The tissue within is completely destroyed and the proliferation of such parts increases the thickness from two to four-fold. When full-grown the larva cuts an exit hole through one side of the swelling and leaves the joint to pupate near the base of the plant.

The larval exit hole permits the several scavenging flies (*Volucella esuriens* Fabricius, *V. avida* Osten Sacken, *V. fasciata* Macquart, *V. pusilla* Macquart, *Copestylum marginatum* Say, *Hermetia illucens* Linn., *H. chrysopila* Loew, and *H. hunteri* Coquillett) to oviposit within the swollen portion. The maggots find ideal conditions in the excrement of the former inhabitant and the moisture from the injured plant tissues. These maggots are, during their development, able to extend the damage so that further healthy areas of the joint are invaded. In those instances in which exit holes were placed high enough to prevent the draining away of the resulting liquefaction, this secondary injury may be extended into the next joint below. The net result is the death of joints so affected.

Occasionally a swollen joint is found which contains no larva and which is without an exit hole. In view of the plant resistance already noted, it is believed that such missing larvæ were overcome by the plant reaction after the cavity had been started. In such joints the swelling diminishes greatly but the sides do not reunite.

DISTRIBUTION

Olyca junctolineella occurs throughout the cactus area in Texas. During the writer's observations it has been found most abundant in the Uvalde, Texas, region. It has also been taken at many points in Mexico as far south as Cuernavaca, State of Morelos. The writer observed one larva in an Opuntia growing on the floor of the Grand Canyon in Arizona which appeared to be of this species.

NATURAL ENEMIES. PARASITES

A number of parasitic insects appeared in rearing cages containing field-collected material, but only a portion of them may definitely be listed as parasites of this moth-borer.

Apanteles mimoristæ Muesebeck is perhaps the most important. The parasitized host larva attains full size and spins its cocoon normally, except perhaps for being of lighter construction. The host larva is destroyed just before pupation, and shortly the Olyca cocoon is found to contain large numbers of the Apanteles cocoons. The number of adult parasites emerging from one host cocoon was found to vary between twenty-five and ninety.

On one occasion observations were made upon the happenings in small fruit jars to which had been added Olyca larvæ, Apanteles adults and a cactus joint. The parasites would not ovipost in the newly hatched larvæ. Their constant reaction on touching these small larvæ during their rapid crawling about the jar was merely indicative of increased excitement and hurried avoidance. When placed with Olyca larvæ about one week old, the parasites oviposted deeply within the larvæ immediately upon finding them. The ovipositor was often allowed to remain inserted several seconds while the larva twisted and squirmed. The larvæ were so pierced a great number of times during the observation. These larvæ when subsequently placed upon Opuntia, entered it and fed normally for some two weeks when the lot was abandoned preparatory to a change of headquarters.

These observations indicate that, in the field, this parasite oviposits in the larvæ at the time they leave the originally infested, fallen joints and crawl again upon the plant to enter new joints.

Pareniaca schwarzi Cwfd. and *Chalcis pedalis* Cress. have been found as common, though not abundant, parasites of *O. junctolineella.*

Second in importance to the Apanteles above mentioned are *Frontina aletiæ* Riley and *Phaonia* n. sp. These dipterous parasites affect the host larva similarly to *Apanteles*

mimoristæ, the puparia appearing within the host cocoon shortly after the latter is spun. The numbers are not nearly so large, however, usually from four to eight being present.

PREDATORS

This species is subject to attack by ants, not only as mature larvæ seeking the ground for pupation, but also as small larvæ emerging from originally entered joints which fell to the ground under the combined attack of the newly hatched larvæ from one or several egg-sticks. It has been noted above that the falling of joints infested with small larvæ brings about the distribution of the larvæ over the cactus clump. It is believed that the depredations of ants at this time are responsible for the scarcity of larvæ in the average clump.

ZOOLOGICAL RECORD—PART INSECTA

The "Insecta" part of the "Zoological Record" (as distinguished from the complete volume) will in future be published by, and only obtainable from, the Imperial Bureau of Entomology. The price for the part will be 15/-, as heretofore. It is, however, proposed as an experiment to break up a limited number of copies into the five sections, which will be sold as follows:

Section A.	List of Titles and Subject Index	4/-
Section B.	Coleoptera	6/-
Section C.	Lepidoptera	6/-
Section D.	Hymenoptera and Diptera	4/-
Section E.	Hemiptera, Orthoptera and remaining Orders	4/-

The above division has been instituted for the benefit of those entomologists who are interested in a portion only of the systematic part of the work. It is in the nature of an experiment only and cannot be continued unless it is widely supported.

All orders for the "Insecta" part, or any sections of it, should be addressed to the Assistant Director, Imperial Bureau of Entomology, 41, Queen's Gate, London, S. W. 7. Orders for the complete volume of the "Zoological Record" should continue to be sent to the Zoological Society of London, Regent's Park, London, N. W. 8.

NEW AND RARE LEPIDOPTERA FROM THE SOUTHWEST

BY WM. BARNES AND F. H. BENJAMIN

Decatur, Illinois

TIMOCHARES RUPTIFASCIATUS Ploetz

1884, Ploetz, Jahr. Nass. Ver. Nat., XXXVII, 27, *Antigonus.*
1896, Godman & Salvin, Biol. Centr.-Amer., Lep., Rhop., II, 418, pl. LXXXVIII, ff. 1-2, *Timochares.*
1901, Skinner, Ent. News, XII, 171, *Timochares.*
1905, Dyar, Jour. N. Y. Ent. Soc., XIII, 119, *Timochares.*
1921, Lindsey, Hesp. Am., p. 56, *Timochares.*
1923, Skinner & Williams, Trans. Am. Ent. Soc., XLVIII, 305, fig. 29 ♂ genit., *Timochares.*

Apparently U. S. records of this species are rare. Lindsey records a specimen from Brownsville, Texas, Barnes collection, but Skinner and Williams have apparently overlooked this and record only the Runyon catch from Southern Arizona or California.

Mr. O. C. Poling recently sent a specimen from the Baboquivari Mts., Pima County, Arizona, 20 September, 1924. This we submitted to Mr. Shaus for comparison with his Mexican specimens as the markings are somewhat darker than those of the Texas specimen before us.

Polia stricta race **kappa** Barnes & Benjamin, nov.

Head and thorax ferruginous, more or less darkened by black scales. Abdomen luteous, tinged with rufous. Fore wing variable in color, the ground color some shade of luteous, suffused with bright ferruginous red and more or less darkened by black scales, in general the ferruginous cast dominant; basal maculation indistinct but basal dash usually present on the freshest specimens. Ordinary lines, spots, and maculation, as in typical *stricta.* Hind wing of ♂ white, the veins and outer margin more or less soiled by fuscous. An obsolescent discal spot. Fringe white at tip, with an obsolescent interline and yellowish-white base. Hind wing of ♀ similar but with more fuscous on it.

Expanse: ♂, 23-28 mm., ♀, 24-28 mm.

Similar to typical *stricta* but differing from all described forms by the much paler hind wings which are nearly as white as those of *spiculosa.*

At first we considered the present subspecies to be *tenisca* and may have determined it as such for other collections. "*Mamestra*" *tenisca* was described by Smith from a series of specimens from Bozeman, Montana, and Stockton, Utah, the type ♂ being a Bozeman specimen in the Smith collection. The recent acquisition of a series of specimens from both of the type localities of *tenisca* show that Nevada material is not quite typical as it varies from forms nearly as pale as *kappa* to forms as dark as *tenisca*. The specimen from Reno, Nevada, figured by Barnes & McDunnough (1913, Contrib. N. H. Lep. N. A., II, (1), 22, pl. X, f. 10) seems nearly typical of ♀ *tenisca*. While all forms of *stricta* seem more or less variable in each locality, and Nevada material is intermediate, producing some specimens which can be placed under any of the present subspecific names, nevertheless our series of the white hind winged form is so distinct from the variations found in the type localities of the described subspecies, and in itself is so constant with its pale secondaries, that we have no hesitation in describing it.

Type locality: Inyo County, California, mostly from Round Valley.

Number and sexes of types: Holotype ♂, 15-30 Aug., Allotype ♀, 220 Paratypes, both sexes, various dates Aug., Sept., Oct.; O. C. Poling collector. Types in Barnes collection.

Graptolitha tarda Barnes & Benjamin, sp. nov.

Head, collar and thorax dull ash gray mixed with black. Thoracic crest large, marked by a slim black stripe. Abdomen basally gray, caudally more ochreous. Fore wing dull ash-gray, the costal region somewhat paler than the remainder of the wing. Ordinary lines and spots obsolescent, nearly obsolete; no basal line or dash; t. a. line marked by a few black scales; median line similar; their course indeterminate. Orbicular absent; reniform mainly visible as a slight rufous cast at end of cell. T. p. line so poorly marked its exact course cannot be seen, but apparently with a tendency to be produced to points on the veins and to be bent inward in submedian fold where it shows as a V pointed inward, and is connected to a pointed claviform by a small black bar. S. t. line indicated by a few scattered black scales. Veins of terminal area slightly darkened. Fringe a little browner than the wing color and obscurely interlined. Hind

wing pale red-brown with a decided pinkish cast; usual discal dot and terminal line present but not conspicuous. Fringe pale, whitish tinged with pink. Beneath: dull; fore wing gray tinged with pink; hind wing whitish tinged with grey and pink. Discal dot present on each wing.

Expanse: 36 mm.

Allied to *fagina* and *itata.* Smaller, duller, and darker than the former, with the markings not so distinct, but although at once separable, closely allied by the paler costal area, lack of a basal dash, and the proximity of the claviform to the t. p. line, leaving room for only a very short black dash in the submedian fold. Closely allied to *itata,* with which it agrees in wing-shape, size, and general color. In true *itata,* as represented by the types, there is a tendency for the transverse maculation to be obscured, but the black dashes in the reniform, and the median and subterminal parts of the submedian fold are distinct, as is the subapical shade. While the present species has the distinct bar in the submedian fold connecting the claviform to the t. p. line, the remainder of the longitudinal maculation has been so reduced that it is invisible except for the faint indication of a few black scales, while the orbicular is entirely absent and the reniform mainly indicated by a reddish suffusion. The legs of the present species lack the strong longitudinal black lines present, one on each leg, of allied species.

Type locality: Douglas, Arizona.

Number and sexes of types: Holotype ♂, 16-23 June, unique, in Barnes collection.

Xanthothrix ranunculi form **albipuncta** Barnes & Benjamin, nov.

Head, thorax and fore wing black dusted with olivaceous, the latter with a round white spot near end of cell. Secondaries blackish. Other characters as in *ranunculi* which is a very variable species.

Expanse: ♂, 11 mm.; ♀, 10 mm.

No mention is made in the original description of *ranunculi* of any white spotted form, nor do the types in the Henry Edwards collection show any traces of spots on the primaries.

Type locality: Kaweah, California.

Number and sexes of types: Holotype ♂, Allotype ♀, both 10 April, 1902, in Barnes collection.

LANIIFERA CYCLADES Druce

1895, Druce, Biol. Centr.-Amer., Lep., Het., II, 220, pl. LXI, ff. 12-13, *Pachynoa.*

1899, Hampson, Proc. Zool. Soc. Lond., p. 184, *Laniifera.*

1903, Dyar, Bull. U. S. N. M., LII, 380, No. 4328, *Laniifera.*

We received a single specimen from O. C. Poling, Baboquivari Mts., Pima County, Arizona, 1-15 August 1923, which agreed well with Druce's figures and with a specimen from Mexico, ex Kearfott collection. A second specimen has been received from Dr. Vorhies of the Arizona Experiment Station bred from prickly-pear and labeled Santa Rita Mts., Arizona, VI-23-24.

This species, described from Mexico, was recorded in Dyar's list from Arizona, presumably by Prof. Fernald.

In view of the recent research in insect enemies of the prickly-pear, this note may be of some importance. The insect is a member of the Pyralid subfamily Pyraustinæ, is of large size and decided possibility in the control of the cactus.

THE VAN DUZEE COLLECTION OF HEMIPTERA

At the regular August meeting of the California Academy of Sciences, Mr. E. P. Van Duzee presented to the Academy his entire collection of Hemiptera under practically the same conditions under which the Van Dyke Collection of Coleoptera was accepted by the Academy last year, as announced in this journal (Vol I, page 13). Under these conditions he retains general supervision over the collection during his lifetime with the privilege of temporarily withdrawing for study any of the specimens he may need for use at home. He also stipulated that each specimen in this collection is to have attached a label to read "E. P. Van Duzee Collection," and that all these specimens are to be incorporated into the systematic collections of the Academy and that they are not to be used for exchange or for exhibition purposes. These conditions secure to him the use of the material during his lifetime and safeguard it against being dissipated or lost through carelessness or mismanagement in the future.

NOTES ON ARIZONA PHALAENIDÆ (Lepid.)

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

Polia luteimacula* Barnes & Benjamin, n. sp.

Male antennæ serrate and fasciculate. Head and thorax black, gray, and white mixed, more or less tinged with purple and rufous. Fore wing: ground color gray heavily irrorated and overlaid by black, with some rufous suffusion, and a purplish tinge; basal line obsolescent, waved; t. a. line double, its course slightly outwardly oblique, as outcurved crescents, from costa to median vein, thence to vein 1, and to inner margin; orbicular and reniform not large, faintly outlined by black, pale filled, the filling obscured by dusky central marks and heavy powderings, more or less red tinged, which shade extends beyond the cell to the t. p. line; claviform moderate to small, variable, distinctly outlined by black, filled with a rufous shade which continues to the t. p. line; t. p. line double, black, its outer line indistinct, angled outward below costa, thence oblique to about vein 5, thence incurved, produced to a strong outward point on vein 1, otherwise produced to moderate points on the veins; s. t. a yellowish wavy line defined on both sides by black and terminating in a moderately large, black defined, spot at tornus; a thin black terminal line; fringe fuscous-gray, with darker interline and tips, paler basally. Hind wing: nearly uniformly fuscous, the veins slightly darker; fringe luteous at base, with fuscous interline and pale tips. Beneath: with a dark common line; in general fuscous, the hind wing somewhat paler basally; discal spot obsolete on fore wing, obsolescent on hind wing; fringes as on upper side.

Expanse: ♂, 27-32 mm.; ♀, 30-31 mm.

Closely allied to *rubrifusa* Hamp., but the uniformly dark secondaries easily distinguish it. *P. gnata* Grt. belongs to the same group but its type, in the Neumœgen collection, possesses white hind wings [2]. *P. agnata* Sm. is also allied [3].

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* Indicates specimens were submitted to Dr. William Schaus in order to ascertain that the species had not been described from south of the U. S. border.

2 A further discussion of *gnata* and several other types in the Neumœgen collection has been incorporated in a separate paper.

3 We wish to call attention to the fact that male *agnata* Sm. has serrate antennæ, and if Hampson's characters are employed, belongs to this group.

Also that *segregata* Sm. and *gussata* Sm. are incorrectly placed on our lists, having serrate male antennæ and being closely allied to *plicata* Sm. and *negussa* Sm. In fact, we suspect that *negussa* is simply smooth *gussata*, and the same may be true between *segregata* and *plicata*. Careful study, based on abundant material, will be necessary to ascertain the exact relationship of these four names.

Locality: White Mts., Arizona.

Types: Holotype ♂ ; Allotype ♀ ; 8 ♂, 2 ♀, Paratypes.

Notes: From Barnes collection, collector unknown; types in Barnes collection; Paratype in U. S. N. M.

NEPHELISTIS Hamp

Type *Nephalistis congenitalis* Hamp.

1905, Hampson, Cat. Lep. Phal. B. M., VI, 250, type designated *congenitalis.*

Close to, but probably distinct from, *Trichopolia* Grt., see below.

TRICHOPOLIA Grt.

Type *Trichopolia dentatella* Grt.

1883, Grote, Pap. III, 76, lists *dentatella* and questionably *ptilodonta.*

1895, Grote, Abh. Nat. Ver. Bremen, XIV, 81, type designated *dentatella.*

1905, Hampson, Cat. Lep. Phal. B. M., V, 361, partim., type designated *dentatella.*

1923, Barnes & Benjamin, Bull. B'klyn Ent. Soc., XVIII, 123, type designated *dentatella.*

EUPOLIA Sm.

Type *Eupolia licentiosa* Sm.

1894, Smith, Trans. Amer. Ent. Soc., XXI, 69; p. 70, *licentiosa* sole species and therefore type.

1909, Hampson, Cat. Lep. Phal. B. M., VIII, 544, type designated *licentiosa,* but erroneously placed as section I of *Namangana.*

1923, Barnes & Benjamin, Bull. B'klyn Ent. Soc., XVIII, 123, type designated *licentiosa; licentiosa* = *dentatella, Eupolia* = *Trichopolia.*

We describe the following species in *Trichopolia* although our three specimens lack a dorsal tuft on the second abdominal segment. This tuft in *dentatella* is easily lost, is only visible on some specimens and as all other characters seem very similar, we think the tuft has probably been rubbed off our types of *suspicionis.*

Structurally the species would appear to fall into Hampson's *Nephelistis.* We have already pointed out (1923) that Hampson drew his description of the genus *Trichopolia* from specimens of *ursina* Sm., and found it necessary to erect the genus *Engelhardtia* for type *ursina.*

We do not know if the genus *Nephelistis* will fall into the synonomy of *Trichopolia* or not. Certainly it seems very closely allied, and mainly separated on secondary sexual characters.

Trichopolia comes very close to *Scotogramma,* but the front is not as much rounded out. It is also closely related to *Polia,* and some species now placed in *Eriopyga.* Most of these hairy-eyed genera need careful study to ascertain which should be retained and what species placed in them. Tentatively we place *Trichopolia* between *Admetovis* and *Lophoceramica.* This placement between *Trichoclea* and *Chabuata* brings *Trichopolia* into contact with its obvious exotic affinities, which possess pectinate antennæ in the male sex, such as *Hydræciodes* and *Nephelistis.*

Trichopolia suspicionis* Barnes & Benjamin, n. sp.

Male: Antennæ bipectinate, apically serrate and simple, ciliated. Mid tibiæ with tuft of long hair but not conspicuously dilated. ♀ antennæ simple, the joints slightly marked, ciliated. Androconia absent in both sexes. Palpi pale, marked with black on sides, second joint reaching about middle of frons, third joint porrect. Head and thorax brown irrorated with black, abdomen similar, with dorsal tuft on basal segment only; and slight lateral tufts.

Fore wing: ground color dull wood-brown, grayed by a scattering of black scales; transverse lines single, black; basal line from costa to the end of a short basal black dash, forming a loop; t. a. line outwardly oblique from costa to inner margin, only slightly excurved; claviform obsolescent; orbicular pale, moderate, slightly oblique, faintly outlined by black and with black powdered center; reniform centrally constricted, edged with an obsolescent series of black scales, then a pale faint line followed by a strong black edging, centrally with a blackish outlined inner crescent, the whole mark heavily powdered by black; t. p. line erect on costa, strongly excurved around cell, inwardly oblique, only a little incurved, below; s. t. line obsolete; terminal line thin, broken by veins; fringe pale, checkered by black.

Hind wing: whitish, subhyaline, with small discal spot and darker veins, some fuscous suffusion outwardly; a thin terminal fuscous line; fringe white, obsolescently interlined, and with yellowish base. Beneath: whitish; the fore wing more or less suffused with fuscous, especially in cell and on veins, with discal spot and t. p. line showing through, terminal line and fringe as on upper side; hind wing with only a scattering of fuscous scales, mostly on veins; terminal line and fringe as on upper side.

Expanse: ♂, 26-28 mm.; ♀, 26 mm.

From the only allied species, *dentatella,* known to us, the present species differs by the pectinations of the male antennæ being but about half as long, while the general coloration is much paler, the transverse lines much stronger and blacker.

Locality: Sells Post Office, Indian Oasis, Pima County, Arizona.

Types: Holotype ♂, Allotype ♀, 1 ♂ Paratype, all 1-10 May, 1923.

Notes: O. C. Poling, collector.

ATHETIS Hbn.

Type *Noctua dasychira* Hbn.

1822, Hubner, Verz. bek. Schmett., p. 209, lists *dasychira, palustris, caliginosa* and *cubicularis.*

1909, Hampson, Cat. Lep. Phal. B. M. VIII, 299, type designated *furvula,* apparently for synonym *dasychira.*

1911, Warren, in Seitz, Macrolepid., III, 207; p. 208, type designated *furvula,* apparently for synonym *dasychira.*

1916, McDunnough, Ent. News, XXVII, 397, replaced by *Caradrina.*

ATYPHA Hbn.

Type *Noctua pulmonaris* Esp.

1822, Hubner, Verz. bek. Schmett., p. 213, lists *pulmonaris argillacea* and *ochroleuca.*

1909, Hampson, Cat. Lep. Phal. B. M., VIII, 299, type designated *pulmonaris.*

HAPALOTIS Hbn.

Type *Noctua furvula* Hbn.

1825, Hubner, Verz. bek. Schmett., p. 254, lists *furvula, lupula, ravula, fuscula (polygramma), atratula, candidula* and *venustula (hybnerana).*

1909, Hampson, Cat. Lep. Phal. B. M., VIII, 299, type designated *furvula.*

NEBRISSA Wlk.

Type *Nebrissa bimacula* Wlk.

1862, Walker, Jour. Linn. Soc., Zool., VI, 194.

1909, Hampson, Cat. Lep. Phal. B. M., VIII, 299, type designated *bimacula.*

ANORTHODES Sm.

Type *Anorthodes prima* Sm.

1891, Smith, Trans. Amer. Ent. Soc., XVIII, 114, *prima* sole species and therefore type.

1909, Hampson, Cat. Lep. Phal. B. M., VIII, 299, type designated *tarda,* apparently for synonym *prima.*

Athetis Hbn. as used by Hampson is apparently correct in place of *Caradrina* as used in the Barnes & McDunnough Check List. *Caradrina* has type *i-intactum* by Duponchel, 1829, and will likely replace *Lycophotia* Hbn. as used by Hampson and Barnes & McDunnough.

Elaphria Hbn., placed by Hampson as a synonym of *Athetis* was first described in the Zutr. Exot. Schmett., I, pl. XIII, *grata* sole species and therefore type. This will have priority over the monotypic genera *Monodes* Gn. (type *nucicolora* Gn.) and *Alpesa* Wlk. (type *villicosta* Wlk.)

Athetis indigena* Barnes & Benjamin, n. sp.

Palpi cream-colored, black at the sides. Head and thorax pale brownish with a violaceous cast. Collar with a broad black band at its base, else concolorous with the thorax. Abdomen pale brownish above, yellowish beneath, the genitalia of the male surrounded by long yellow hair. Fore wing: ground color dull pale wood brown, with a slight violaceous tinge and a silken lustre, darkened and grayed by scattered black scales, lines black; basal line geminate, its outer line indistinct, waved from costa to submedian fold, obsolescent below; t. a. line geminate, its inner line obsolescent, appearing as a dot on costa and again as a thin irregular line from costa to inner margin; orbicular obsolescent, more or less indicated by a faint ring of black scales; claviform obsolete; reniform indistinct, black centered due to intersection by an obscure median shade, marked by four pale yellowish points; t. p. line faintly geminate, the inner line stronger, as a dot on costa excurved around cell, incurved below, produced to points on the veins; s. t. obsolescent, its course indicated by a faint yellowish shade which is marked inwardly by slight dusky shades and one or two black dashes; a thin terminal line broken by the veins; fringe luteous at base, dark and obscurely interlined. Hind wing: ♂, whitish, subhyaline, the veins and outer portion darkened by fuscous; ♀, darker, almost appearing fuscous; fringe yellowish at base, with gray interline and white tips. Beneath: whitish, the fore wing largely suffused with fuscous with slight discal dot and transverse line; hind wing with scattered fuscous scales mainly along veins and toward the outer margin which is somewhat darkened, with discal dot and transverse line: fringes, all wings, as on upper side: sexes similar on under side.

Expanse: ♂, 29-32 mm.; ♀, 31-33 mm.

Allied to *triquetra,* with a similar set of black subterminal marks but lacking the black in the costal-subterminal region; at once distinguishable by the entirely different type

of reniform and the black at the base of the collar. It is also considerably heavier in build. Perhaps *triquetra* and *indigena* should be placed in *Ariathisa;* but we prefer to retain them with their North American allies.

"Caradrina" derosa Morr., is placed by Hampson as a synonym of *capularis* Gn., but a figure of the type would indicate that it might be more nearly related to *indigena.* We know of nothing like this figure, which does not seem to match Hampson's plate CXXXII, figure 12 of *capularis;* having strong black markings on the reniform. Not knowing how much *capularis* varies, we hold the status of *derosa* in abeyance. Even if distinct from *capularis* it is probably exotic.

Localities and number and sexes of types: Holotype ♂, Brown's Cañon, Baboquivari Mts., Pima County, Arizona, elevation approximately 5000 ft., (O. C. Poling), 1-15, June, 1923; Allotype ♀, id.; 2 ♂ Paratypes, id.; 1 ♂ 1 ♀ Paratypes, Baboquivari Mts., Pima County, Arizona, elevation approximately 5000 feet (O. C. Poling), 15-30 June, 1923, 1 ♂ Paratype, Palmerlee, Arizona, 8-15 May.

Notes: Types in Barnes collection: Paratype in U. S. N. M.

Celiptera valina Schs.

1901, Schaus, Ann. Mag. N. H., (7), VIII, 86, *Mocis.*
1913, Hampson, Cat. Lep. Phal. B. M., XIII, 135, pl. CCXXV, f. 5 (type), *Celiptera.*

Two males, three females, were received from the Baboquivari Mts., Arizona (O. C. Poling), dates 15-30 July, 1-15 August, 15-30 August, 1-15 September.

The females agreed with Hampson's figure. Two males, one female, were sent to Dr. Schaus for comparison with his type and series.

The species is rather variable. It also appears somewhat sexually dimorphic, the males darker marked and lacking the yellow found in the transverse lines of the females. This is replaced by rather diffused black.

A NEW ACINOPTERUS FROM SOUTHERN CALIFORNIA

BY HERBERT OSBORN

Acinopterus aridellus Osborn, n. sp.

Head scarcely as wide as pronotum, vertex broad, distinctly angulate, with a faint transverse depression, one-third longer at middle than next the eye, longer and more pointed in male, front broad, tapering uniformly from antennal pits, clypeus long, expanding towards the tip, loræ large, nearly touching margin of cheek, cheek margins sinuate, pronotum a little longer than vertex, elytra long, apex rather broad, acute at tip; female last ventral segment twice as long as preceding, hind margin rounded, minutely notched at tip; male valve concealed or wanting, plates narrow, long, reaching nearly to tip of pygofer.

Color: dark gray, suffused with pinkish, especially at tip of vertex and on the elytral veins; ocelli whitish, three obscure whitish lines on the pronotum, extending on to the scutellum; elytra hyaline, the veins whitish, or tinged with pink, and margined with fuscous; beneath yellowish, tinged with pinkish.

Length; male and female, 4.5-5 mm.

Described from one female (type) two males, (allotype and paratype) collected by the writer at Palm Cañon, Imperial County, California, March 8, 1924. They occurred upon a small creeping plant outside the canyon mouth and amongst barrel cactus, creosote, and sagebrush, in distinctly arid conditions. It is decidedly smaller, especially more slender, than *acuminatus* or *angulatus,* and the vertex is longer, especially in the male, where it is quite distinctly angulate. Type in Author's collection.

Two Arizona Hemiptera

Ganocapsus filiformis Van Duzee was taken by me in large numbers on a species of sunflower at Patagonia, Santa Cruz County, Arizona, about the first of August, 1924. It occurred on other weeds and grasses in the same locality, but seemed to be breeding on the sunflower only. With it were taken numbers of *Garganus splendidus* Distant, not before recorded from north of the Mexican border.—E. P. Van Duzee.

THE CONIFEROUS TREES OF THE UNITED STATES WITH THE SCOLYTID (IPID) BEETLES SAID TO ATTACK THEM

BY W. J. CHAMBERLIN
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The following list contains such coniferous trees as are reported to be the host of one or more of the bark or ambrosia beetles. This list has been compiled from all available literature, from field and laboratory records of the Oregon Experiment Station, from ten years collecting in the western forests by the author and lastly from material obtained by exchange.

Although the list is far from complete and some of the records as given in literature, especially in the older papers, are probably inaccurate, it is felt that this preliminary list will prove of value and may stimulate others to check it carefully and make known any errors, corrections or additions so that a more complete and accurate list may be compiled at a future time.

A few of the rarer trees are not listed, since no record of their being attacked by scolytids, has been noted. Undoubtedly all of them have their scolytid enemies and investigation of such trees should be carried on by those so situated as to be able to do so.

Mr. Ralph Hopping's paper, "Coniferous Hosts of the Ipidæ of the Pacific Coast and Rocky Mountain Region," which appeared in the Canadian Entomologist, Vol. 54, pp. 128-134, has been of great value in compiling the present paper.

The trees are listed alphabetically, according to genera and species.

1. *Abies amabilis.* Lovely fir

Cryphalus amabilis Chamb.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Poylgraphus rufipennis (Kby.)
Pseudohylesinus nobilis Sw.
Trypodendron sp.

2. *Abies balsamus.* Balsam fir

Cryphalus balsameus Hopk.
Crypturgus balsameus Sw.
atomus Lec.
Dryocœtes confusus Sw.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Pityokteines sparsus (Lec.)
Pityophthorus balsameus Blkm.
bassetti Blkm.
Pityophthorus canadensis Sw.
opaculus Lec.
patchi Blkm.
puberulus Lec.
[1] Platypus wilsoni Sw.
Scolytus piceæ (Sw.)
[2] Trypodendron lineatus (Oliv.)
ponderosæ Sw.
[3] Xyleborus xylographus (Say.)

3. *Abies concolor.* White fir

See species under *A. grandis*

4. *Abies fraseri.* Fraser's fir

Cryphalus fraseri Hopk.
Gnathotrichus retusus (Lec.)

5. *Abies grandis.* Grand fir

Conophthorus monticolæ Hopk.
Cryphalus approximatus Hopk.
grandis Chamb.
pubescens Hopk.
subconcentralis Hopk.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Pityokteines elegans Sw.
Platypus wilsoni Sw.
Pseudohylesinus grandis Sw.
elongatus Sw.
granulatus (Lec.)
Scolytus kigeri Chamb.
præceps Lec.
unispinosus Lec.
ventralis Lec.
subscaber Lec.
Trypodendron lineatus Oliv.
Xyleborus xylographus Say.

6. *Abies lasiocarpa.* Alpine fir

Cryphalus borealis Sw.
canadensis Chamb.
Dryocœtes confusus Sw.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Ips borealis Sw.
Orthotomicus lasiocarpi Sw.
Pityokteines elegans Sw.
Pityophthorus pseudotsugæ Sw.
Platypus wilsoni Sw.
Trypodendron sp.

7. *Abies magnifica.* Magnificent fir

Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Leperisinus imperialis Eich.
Pseudohylesinus granulatus (Lec.)
Scolytus ventralis Lec.
Trypodendron lineatus Oliv.
Pityokteines elegans Sw.
Platypus wilsoni Sw.
Xyleborus xylographus Say.

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[1] Not a Scolytiæ but so closely related in habits and work that the family (Platypodidæ) is included in this list.

[2] This may be T. bivittatus (Kirby).

[3] *X. xylographus* is given as breeding in a great many species of conifers in the older publications. These are probably all errors in determination and this species probably confines its work to hardwood trees in the Eastern United States.

8. *Abies nobilis.* Noble fir

Gnathotrichus retusus (Lec.) sulcatus (Lec.)
Hylastes longicollis Sw.
Platypus wilsoni Sw.
Pseudohylesinus nobilis Sw.
Trypodendron lineatus Oliv.
Xyleborus xylographus Say.

9. *Abies venusta.* Bristle-cone fir

Gnathotrichus retusus (Lec.) sulcatus (Lec.)
Trypodendron lineatus Oliv.

10. *Chamæcyparis lawsoniana.* Port Orford cedar

Phlœosinus punctatus Lec.
Pityokteines minutus Sw.

11. *Chamæcyparis nootkatensis.* Alaska cedar

Phlœosinus punctatus Lec. nitidus Sw.
Phlœosinus dentatus (Say)
Pityokteines minutus Sw.

12. *Chamæcyparis thyoides.* White cedar

Phlœosinus dentatus (Say)

13. *Cupressus macrocarpa.* Monterey cypress

Phlœosinus cristatus Lec.
Phlœosinus cupressi Hopk.

14. *Cupressus sargentii.* Sargents cypress

Phlœosinus cupressi Hopk.
Phlœosinus minutus Sw.

15. *Juniperus californica.* Desert white cedar

Trypodendron sp.

16. *Juniperus communis.* Common juniper

Phlœosinus sp. dentatus (Say)
Trypodendron sp.

17. *Juniperus flaccida.* Juniper

Phlœosinus dentatus (Say)

18. *Juniperus occidentalis.* Western juniper

Phlœosinus juniperi Sw.
Phlœosinus rugosus Sw.

19. *Juniperus scopulorum.* Rocky Mountain Juniper

Phlœosinus hoppingi Sw. scopulorum Sw.
Xyleborus scopulorum Hopk.

20. *Juniperus virginiana.* Eastern white cedar

Phlœosinus dentatus (Say)
Phlœosinus enixus Blkm.

21. *Larix alaskansis.* Alaskan larch

Trypodendron lineatus Oliv.
Xyleborus xylographus Say.

22. *Larix americana.* American larch

Crypturgus pusillus Gyll.
Dendroctonus simplex Lec.
Dryocœtes americanus Hopk.
autographus Ratz.
Ips pini (Say)
balsameus Lec.
Orthotomicus cælatus (Eich.)
Polygraphus rufipennis Kby.
Scolytus picea Sw.

* 23. *Larix lyallii.* Tamarack

Crypturgus atomus Lec.
Dendroctonus simplex Lec.
pseudotsugæ? Hopk.
Dryocœtes americanus Hopk.
Orthotomicus cælatus (Eich.)
Gnathotrichus materiarius (Fitch)
Hylurgops pinifex (Fitch)
Ips pini Say
Phlœosinus serratus Lec.
Pityokteines sparsus (Lec.)
Pityophthorus opaculus Lec.
Polygraphus rufipennis Kby.
Trypodendron lineatus Oliv.
bivittatum Kby.
Xyleborus xylographus Say

24. *Larix occidentalis.* Western larch

Crypturgus borealis Sw.
Dendroctonus pseudotsugæ Hopk.
valens Lec.
Ips emarginatus (Lec.)
Orthotomicus vicinus (Lec.)
Pityophthorus intextus Sw.
Polygraphus rufipennis Kby.
Scolytus unispinosus Lec.
Xyleborus xylographus Say

25. *Libocedrus decurrens.* Incense cedar

Phlœosinus attenuatus Sw.
cupressi Hopk.
Phlœosinus punctatus Lec.
hoppingi Sw.
Phlœosinus vandykei Sw.
fulgens Sw.
Platypus wilsoni Sw.

26. *Picea breweriana.* Weeping spruce

Dendroctonus valens Lec.
Gnathotrichus sulcatus (Lec.)
Polygraphus rufipennis Kby.
Xyleborus xylographus Say

27. *Picea canadensis.* White spruce

Carphoborus carri Sw.
Cryphalus mainensis Blkm.
Crypturgus atomus Lec.
borealis Sw.
Dendroctonus engelmanni Hopk.
johanseni Sw.
piceaperda Hopk.
terebrans (Oliv.)
valens Lec.
Dryocœtes americanus Hopk.
affaber (Mann.)
caryi Hopk.
piceæ Hopk.
septentrionis (Mann.)
Gnathotrichus materiarius (Fitch)
sulcatus (Lec.)
Hylurgops pinifex (Fitch)

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* Undoubtedly most of the records for *L. lyallii* should be referred to *L. occidentalis*. *Lyallii* is a rare alpine species.

Ips chagnoni Sw.
engelmanni Sw.
interruptus (Mann.)
Ips pini (Say)
Orthotomicus cælatus (Fitch)
Phthorophlæus picea Sw.
Pityogenes hopkinsi Sw.
Pityophthorus dentifrons Blkm.
Pityophthorus intextus Sw.
nudus Sw.
nitidus Sw.
opaculus Lec.
patchi Blkm.
Pityophthorus puberulus Lec.
shepardi Blkm.
Polygraphus rufipennis (Kby.)
Scierus annectens Lec.
Scolytus piceæ Sw.
Stephanoderes quadridentatus Hopk.
Tryopdendron bivittatus Kby.
borealis Sw.
cavifrons (Mann.)
Xyleborus xylographus Say
Xylechinus americanus Blkm.

28. *Picea engelmanni.* Englemann spruce

* Dendroctonus borealis Hopk.
engelmanni Hopk.
monticolæ Hopk.
murrayanæ Hopk.
ponderosæ Hopk.
valens Lec.
Dryocœtes affaber (Mann.)
americanus Hopk.
septentrionis (Mann.)
Gnathotrichus sulcatus (Lec.)
Hylastes macer Lec.
Hylurgops rugipennis (Mann.)
Ips dubius Sw.
engelmanni Sw.
interpunctus (Eich.)
yohoensis Sw.
Orthotomicus vicinus (Lec.)
Pityogenes carinulatus (Lec.)
Pityokteines minutus Sw.
Pityophthorus atratulus (Lec.)
bassett Blkm.
intextus Sw.
nitidulus (Mann.)
occidentalis Blkm.
pseudotsugæ Sw.
Polygraphus rufipennis (Kby.)
Procryphalus striatulus (Mann.)
Scierus annectens Lec.
piceæ Sw.
Scolytus unispinosus Lec.
Trypodendron lineatus Oliv.
ponderosæ Sw.

29. *Picea mariana.* Black spruce

Crypturgus atomus Lec.
Dendroctonus rufipennis (Kby.)
frontalis (Oliv.)
rufipennis (Kby.)
piceaperda Hopk.
ponderosæ Hopk.
terebrans (Oliv.)
valens Lec.
americanus Hopk.
Dryocœtes granicollis Lec.
Gnathotrichus materiarius (Fitch)
sulcatus (Lec.)
Hylurgops pinifex (Fitch)
Ips grandicollis (Eich.)
pini (Say)
Orthotomicus cælatus (Eich.)
Pityophthorus cariniceps Lec.
[1] hirticeps Lec.
tuberculatus Eich.
Polygraphus rufipennis (Kby.)
Trypodendron bivittatum (Kby.)
lineatus Oliv.
Xyleborus xylographus Say
Xyloterinus politus (Say)

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* *D. borealis* and *D. engelmanni* are probably the same species.
[1] *P. pulchellus* Eich.

30. *Picea pungens.* Blue spruce

Dendroctonus engelmanni Hopk.
ponderosæ Hopk.
valens Lec.
Dryocœtes affaber (Mann.)
Gnathotrichus sulcatus (Lec.)
Ips pini (Say)
Polygraphus rufipennis Kby.
Trypodendron lineatus Oliv.
Xyleborus xylographus Say.

31. *Picea rubra.* Red spruce

Cryphalus mainensis Blkm.
rubentis Hopk.
Crypturgus atomus Lec.
Dendroctonus piceaperda Hopk.
punctatus Lec.
terebrans Oliv.
valens Lec.
Dryocœtes americana Hopk.
Gnathotrichus materiarius (Fitch)
sulcatus (Lec.)
Hylurgops pinifex (Fitch)
Orthotomicus cælatus (Eich.)
Pityophthorus biovalis Blkm.
briscœi Blkm.
opaculus Lec.
puberulus Blkm.
shepardi Blkm.
dentifrons Blkm.
Polygraphus rufipennis Kby.
Trypodendron lineatus Oliv.
Xyleborus xylographus (Say)
Xylechinus americanus Blkm.

32. *Picea sitchensis.* Sitka spruce

Crypturgus borealis Sw.
Dendroctonus obesus (Mann.)
Dolurgus pumilus (Mann.)
Dryocœtes affaber (Mann.)
septentrionis (Mann.)
Hylurgops rugipennis (Mann.)
Ips concinnus (Mann.)
interruptus (Mann.)
Ips vancouveri Sw.
Pityophthorus atratulus (Lec.)
nitidulus (Mann.)
puncticollis (Lec.)
Platypus wilsoni Sw.
Polygraphus rufipennis (Kby.)
Pseudohylesinus sitchensis Sw.
Trypodendron cavifrons (Mann.)

33. *Pinus albicaulis.* White-bark pine

Dendroctonus monticolæ Hopk.
Gnathotrichus sulcatus (Lec.)

34. *Pinus attenuata.* Knobcone pine

Dendroctonus monticolæ Hopk.
valens Lec.
Gnathotrichus asperulus (Lec.)

35. *Pinus balfouriana.* Foxtail pine

Dendroctonus monticolæ Hopk.
valens Lec.
Gnathotrichus sulcatus Lec.
Hylurgops pinifex (Fitch)
rugipennis (Mann.)
Ips grandicollis Eich.
vancouveri Lec.
Xyleborus pubescens Zimm.
xylographus (Say.)

36. *Pinus caribæa.* Slash pine

Crypturgus pusillus Gyll.
Dendroctonus frontalis Zimm.
terebrans Oliv.
Ips calligraphus (Germ.)
grandicollis (Eich.)
Pityogenes comatus (Zimm.)
granulatus Sw.
plagiatus (Lec.)
Pityophthorus publicarius (Zimm.)

37. *Pinus clausa.* Sand pine

Crypturgus pusillus Gyll.
Dendroctonus frontalis Zimm.
Ips grandicollis (Eich.)
Pityoborus comatus Zimm.

38. *Pinus contorta (murrayana).* Lodgepole pine

Conophthorus contortæ Hpk.
Crypturgus pusillus?
Dendroctonus monticolæ Hpk.
murrayanæ Hopk.
ponderosæ Hopk.
valens Lec.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Hylurgops lecontei Sw.
pinifex (Fitch)
rugipennis (Mann.)
subcostulatus (Mann.)
Ips concinnus (Mann.)
emarginatus (Lec.)
grandicollis (Eich.)
guildi Blkman.
interpunctatus (Eich.)
latidens (Lec.)
Ips oregoni (Eich.)
pini (Say)
plastographus (Lec.)
radiatæ (Hopk.)
vancouveri Sw.
Orthotomicus ornatus Sw.
Pityogenes carinulatus (Lec.)
fossifrons (Lec.)
knechteli Sw.
Pityophthorus atratulus Lec.
confertus Sw.
murrayanæ Blkman.
nitidulus (Mann.)
tuberculatus Eich.
Pseudohylesinus sericeus (Mann.)
Scierus annectens Lec.

39. *Pinus coulteri.* Coulter pine

Dendroctonus terebrans (Oliv.)
* brevicomis Lec.
Dendroctonus valens Lec.
Ips calligraphus (Germ.)

40. *Pinus divaricata.* Jack pine

Dendroctonus punctatus Lec.
rufipennis Kby.
Monarthrum fasciatum (Say)
Pityogenes hopkinsi Sw.
Pityophthorus annectens Lec.
Phlœsinus pini Sw.

41. *Pinus echinata.* Shortleaf pine

Carphoborus bicristatus Chap.
Crypturgus pusillus Gyll.
Dendroctonus frontalis Zimm.
terebrans (Oliv.)
Gnathotrichus materiarius (Fitch)
Ips avulsus (Eich.)
grandicollis (Eich.)

* Record by Ralph Hopping.

Orthotomicus cælatus (Eich.)
Pityogenes plagiatus (Lec.)
Pityophthorus annectens (Lec.)
comatus (Zimm.)
granulatus Sw.
lautus Eich.
Pityophthorus nudus Sw.
pulicarius (Zimm.)
pullus (Zimm.)
Platypus flavicornis (Fab.)
Stephanoderes quadridentatus Hopk.

42. *Pinus edulus.* Pinion

Conophthorus edulis Hopk.
Ips confusus (Lec.)

43. *Pinus flexilis.* Limber pine

Dendroctonus monticolæ Hopk.
ponderosæ Hopk.
Pityophthorus nitidulus (Mann.)
Polygraphus rufipennis (Kirby)

44. *Pinus glabra.* Spruce pine

Dendroctonus frontalis Zimm.
terebrans (Oliv.)
Ips pini (Say)
Pityophthorus annectens Lec.

45. *Pinus jeffreyi.* Jeffrey pine

Crypturgus pusillus Gyll.
Dendroctonus jeffreyi Hopk.
valens Lec.
Gnathotrichus retusus (Lec.)
Hylastes macer Lec.
Hylurgops subcostulatus (Mann.)
Ips concinnus (Mann.)
emarginatus (Lec.)
Ips grandicollis (Eich.)
latidens (Lec.)
oregoni (Eich.)
radiatæ Hopk.
Orthotomicus ornatus Sw.
Pityogenes carninulatus (Lec.)
Pityophthorus confinis Lec.
Xyleborus impressus Eich.

46. *Pinus labmertiana.* Sugar pine

Conophthorus lambertianæ Hopk.
Crypturgus pusillus Gyll.
Dendroctonus monticolæ Hopk.
valens Lec.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Hylurgops rugipennis Mann.
Hylurgops subcostulatus Mann.
Ips confusus (Lec.)
emarginatus (Lec.)
oregoni (Eich.)
latidens (Lec.)
Pityophthorus confertus Sw.
confinis (Lec.)
tuberculatus Eich.

47. *Pinus monticola.* Western white pine

Conophthorus monticolæ Hopk.
Dendroctonus monticolæ Hopk.
valens Lec.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Hylastes nigrinus (Mann.)
Hylurgops pinifex (Fitch)
porosus (Lec.)
rugipennis (Mann.)
subcostulatus (Mann.)
Ips confusus (Lec.)
concinnus (Mann.)

Ips integer (Eich.)
interruptus (Mann.)
latidens (Lec.)
oregoni (Eich.)
vancouveri Sw.
grandicollis (Eich.)
avulsus (Eich.)
Pityogenes fossifrons (Lec.)
Pityophthorus atratulus (Lec.)
confertus Sw.
confinis Lec.
nitidulus (Mann.)
Pityokteines sparsus (Lec.)
elegans Sw.
Platypus wilsoni Sw.
Scolytus monticolæ Sw.

48. *Pinus monophylla.* Single leaf pine

Dendroctonus monticolæ Hopk.
Ips confusus (Lec.)

49. *Pinus muricata.* California swamp pine or prickle-cone pine

Pityophthorus carmeli Sw.
Polygraphus rufipennis (Kby.)

50. *Pinus palustris.* Long-leaf pine

Crypturgus alutaceus Sz.
pusillus Gyll.
Dendroctonus frontalis Zimm.
terebrans (Oliv.)
Ips avulsus (Eich.)
grandicollis (Eich.)
Orthotomicus cælatus (Eich.)
Pityogenes plagiatus (Lec.)
Pityophthorus annectens Lec.
comatus (Zimm.)
pulicarius (Zimm.)
Xyleborus confusus Eich.

51. *Pinus ponderosa.* Western yellow pine

Carphoborus simplex Lec.
Conophthorus ponderosæ Hopk.
Dendroctonus approximatus Dz.
arizonicus Hopk.
[1] barberi Hopk.
brevicomis Lec.
convexifrons Hopk.
jeffreyi Hopk.
monticolæ Hopk.
ponderosæ Hopk.
terebrans? Oliv.
valens Lec.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Hylastes porosus (Lec.)
Hylurgops lecontei Sw.
rugipennis (Mann.)
subcostulatus (Mann.)
Ips concinnus (Mann.)
confusus (Lec.)
grandicollis (Eich.)
emarginatus (Lec.)
Ips integer (Eich.)
interpunctus (Eich.)
knausi Sw.
latidens (Lec.)
oregoni (Eich.)
pini (Say)
radiatæ Hopk.
Orthotomicus ornatus (Eich.)
Pityogenes carinulatus (Lec.)
fossifrons (Lec.)
Pityophthorus atratulus (Lec.)
cariniceps Lec.
Pityophthorus confertus Sw.
confinis Lec.
nitidulus (Mann.)
tuberculatus Eich.
Platypus wilsoni Sw.
Trypodendron ponderosæ Sw.
Xyleborus xylographus (Say)
scopulorum Hopk.

[1] *D. barberi* Hopk. is probably synonymous with *D. brevicomis* Lec.

52. *Pinus pungens.* Table-mountain pine

Crypturgus pusillus Gyll.
Dendroctonus frontalis Zimm.
terebrans (Oliv.)
Gnathotrichus materiarius (Fitch)
Ips grandicollis (Eich.)
Pityogenes plagiatus (Lec.)
Pityophthorus confinis Lec.
puberulus Lec.

53. *Pinus radiata.* Monterey pine

Conophthorus radiatæ Hopk.
Carphoborus radiatæ Sw.
Dendroctonus valens Lec.
Hylastes nigrinus (Mann.)
Hylurgops rugipennis (Mann.)
Ips plastographus (Lec.)
radiatæ Hopk.
Pityophthorus atratulus (Lec.)
carmeli Sw.
Pseudohylesinus sericeus (Mann.)

54. *Pinus resinosa.* Red pine

Dendroctonus frontalis Zimm.
punctatus Lec.
Ips chagnoni Sw.
perroti Sw.
pini (Say)
Monarthrum fasciatum (Say)
Pityogenes hopkinsi Sw.
Pityophthorus balsameus Blkm.
canadensis Sw.
confinis Lec.
puberulus Lec.
pulicarius (Zimm.)
Trypodendron scabricollis (Lec.)

55. *Pinus rigida.* Pitch or Pond pine

Dendroctonus frontalis Zimm.
Gnathotrichus materiarius (Fitch)
Ips callographus (Germ.)
Ips pini (Say)
grandicollis (Eich.)
Polygraphus rufipennis (Kby.)
Trypodendron bivittatum (Kby.)

56. *Pinus sabiniana.* Gray or Digger pine

Dendroctonus valens Lec.
Ips grandicollis (Eich.)
Ips latidens (Lec.)

57. *Pinus strobus.* Eastern white pine

Conophthorus coniperda Sz.
Crypturgus atomus Lec.
Dendroctonus frontalis Zimm.
punctatus Lec.
rufipennis (Kby.)
terebrans (Oliv.)
valens Lec.
Dryocœtes americanus Hopk.
Gnathotrichus materiarius (Fitch)
retusus Lec.
Hylastes porculus Erich.
Hylurgops pinifex (Fitch)
Ips avulsus (Eich.)
calligraphus (Germ.)
chagnoni Sw.
longidens Sw.
pini (Say)
Monarthrum fasciatum (Say)
mali (Fitch)
Orthotomicus cælatus (Eich.)
Pityogenes hopkinsi Sw.
Pityokteines sparsus (Lec.)
Pityophthorus annectens Lec.
biovales Blkm.

Pityophthorus briscœi Blkm.
canadensis Sw.
cariniceps Lec.
confinis Lec.
granulatus Sw.
lautus Eich.
opaculus Lec.
patchi Blkm.
Pityophthorus puberulus Lec.
pullus (Zimm.)
pulicarius (Zimm.)
ramiperda Sw.
Polygraphus rufipennis (Kby.)
Trypodendron bivittatum (Kby.)
Xyleborus impressus Eich.
Xylechinus americanus Blkm.

58. *Pinus tæda.* Loblolly pine

Carphoborus bicristatus Chap.
Crypturgus pusillus Gyll.
Dendroctonus frontalis Zimm.
rufipennis (Kby.)
terebrans (Oliv.)
Gnathotrichus materiarius (Fitch)
Ips avulsus (Eich.)
calligraphus (Germ.)
grandicollis (Eich.)
Orthotomicus cælatus (Eich.)
Pityogenes plagiatus Lec.
Pityokteines sparsus (Lec.)
Pityophthorus annectens Lec.
Pityophthorus bisulcatus Eich.
granulatus Sw.
lautus Eich.
pulicarius (Zimm.)
pullus (Zimm.)
Platypus flavicornis (Fab.)
Stephanoderes quadridentatus Hopk.
Trypodendron scabricollis (Lec.)
Xyleborus pecanis Hopk.

59. *Pinus torreyana.* Torrey pine

Dendroctonus terebrans (Oliv.)
Pityophthorus torreyanæ Sw.

60. *Pinus virginiana.* Scrub pine

Dendroctonus frontalis (Zimm.)
Gnathotrichus asperulus (Lec.)
Trypodendron scabricollis (Lec.)

61. *Pseudotsugæ macrocarpa.* Big-cone spruce

Dendroctonus pseudotsugæ Hopk.
Platypus wilsoni Sw.
Trypodendron ponderosæ Sw.
Xyleborus xylographus (Say)

62. *Pseudotsugæ taxifolia.* Douglas fir

Cryphalus subconcentralis Hopk.
Dendroctonus pseudotsugæ Hopk.
Dryocœtes pseudotsugæ Sw.
Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Hylastes nigrinus (Mann.)
ruber Sw.
Hylurgops grandicollis Sw.
Ips chamberlini Sw.
Pityokteines elegans Sw.
jasperi Sw.
minutus (Sw.)
Pityophthorus confinis Lec.
nitidulus (Mann.)
pseudotsugæ Sw.
Platypus wilsoni Sw.
Pseudohylesinus grandis Sw.
elongatus Sw.
granulatus (Lec.)

Pseudohylesinus nebulosus (Lec.)
sericeus (Mann.)
Scolytus (E) monticolæ (Sw.)
subscaber Lec.
tsugæ (Sw.)
unispinosus Lec.
Scolytus ventralis Lec.
Trypodendron bivittatus (Kby.)
cavifrons (Mann.)
ponderosæ Sw.
Trypodendron sp.
Xyleborus xylographus (Say)

63. *Sequoia gigantea (Washingtoniana).* Big tree

Gnathotrichus sulcatus Lec.
Phlœosinus punctatus Lec.
rubicundulus Sw.
Platypus wilsoni Sw.
Trypodendron sp.

64. *Sequoia sempervirens.* Redwood

Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Phlœsinus cupressi Hopk.
Phlœosinus sequoiæ Hopk.
Platypus wilsoni Sw.
Trypodendron sp.

65. *Taxodium disticum.* Bald cypress

Monarthrum mali (Fitch)
Phlœosinus taxodii Blkm.
Playtypus compositus Say

66. *Thuja occidentalis.* White cedar

Gnathotrichus sulcatus (Lec.)
Phlœosinus canadensis Sw.
dentatus Say

67. *Thuja plicata.* Western red cedar

Gnathotrichus retusus (Lec.)
sulcatus (Lec.)
Phlœosinus cupressi Hopk.
punctatus Lec.
sequoiæ Hopk.
Phlœosinus minutus Sw.
Platypus wilsoni Sw.
Trypodendron cavifrons (Mann.)
Xyleborinus n. sp.

68. *Tsuga canadensis.* Eastern hemlock

Anisandrus obesus (Lec.)
pyri (Peck)
Gnathotrichus sulcatus (Lec.)
Ips longidens Sw.
Monarthrum fasciatum (Say)
Monarthrum mali (Fitch)
Trypodendron bivittatum (Kby.)
Trypodendron sp.
Xyloterinus politus (Say)

69. *Tsuga caroliniana.* Southern hemlock

Anisandrus obesus (Lec.)
pyri (Peck)
Monarthrum mali (Fitch)
Monarthrum fasciatum (Say)
Trypodendron bivittatum (Kby.)

70. *Tsuga heterophylla.* Western hemlock

Gnathotrichus retusus (Lec.) sulcatus (Lec.)
Hylastes nigrinus (Mann.)
Platypus wilsoni Sw.
Pseudohylesinus sericeus (Mann.) tsugæ Sw.

71. *Tsuga mertensiana.* Mountain hemlock

Gnathotrichus retusus (Lec.) sulcatus (Lec.)
Scolytus tsugæ (Sw.)

A New Mirid From Arizona (Hemiptera)

BY E. P. VAN DUZEE
California Academy of Sciences, San Francisco

Mesomiris albescens Van Duzee, n. sp.

Whitish; two spots on pronotal base, scutellar, margins of clavus and an elongated spot near apex of corium and tarsi black; antennæ, bases and tips of tibiæ reddish. Length, 7 mm.

Female: Head broader than in *curtulus;* median incised line confined to vertex which is short; front broad, strongly concave, almost tumid. Rostrum just passing middle of mesonotum. Antennæ: segment I as long as head viewed from above; II as long as from tip of tylus to apex of scutellum; III two-thirds of II; IV four-sevenths of III. Pronotum scarcely wider than long; median line scarcely defined; punctures on collum and scutellum more shallow. Elytra very obscurely punctured. Legs longer than in *curtulus.*

Color whitish, tinged with yellow on head and pronotum; mesonotum and mesosternum croceus, marked with black posteriorly; a large spot on base of pronotum either side; latero-basal edge of scutellum, scutellar margin of clavus and an elongate discal spot near apex of corium (sometimes becoming a faint vitta connecting with the scutellar margin of clavus), black or blackish; antennæ refuscent, becoming darker at apex and paler on base of segment II and upper disk of segment I; eyes dark castaneous; legs tinged with yellow, apex of femora and base and apex of tibiæ red; tarsi black as is the extreme tip of the tibiæ and the apex of rostrum.

Type: female, No. 1816, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, August 8, 1924, along the Babocomari River near Huachuca Station, Arizona. Paratype, female, same data.

ON NIGHT FLYING AND ATTRACTION TO LIGHT IN ACRIDIIDÆ AND THE RELATION OF METEOROLOGICAL CONDITIONS THERETO

BY L. P. ROCKWOOD

U. S. Bureau of Entomology, Forest Grove, Oregon

Published records of night flying and attraction to light in the family Acridiidæ of the Orthoptera appear to be few and not readily discoverable. This behavior has been well established for *Dissosteira longipennis* Thomas in Colorado [1] and New Mexico [2] and a recent article [1] would indicate that this species was the only one in the United States known to fly at night. A search of the literature at hand at this moment, however, adds several species to the list of those taken at light at night, and the observation recorded in this paper adds three more.

Riley, Packard, and Thomas [3] were apparently able to find but one authentic case of observation of flight of Acridiidæ at night in European literature and mention none for America. They pointed out, however, that circumstantial evidence indicated that migratory flights may be continued after nightfall. A flight of large numbers of grasshoppers, thought to have been *Schistocerca americana* Dru., was noted [4] at a lighthouse in Lake Erie off the mouth of the Detroit River between the hours of 11 and 12 p. m. on the night of July 12, 1899. Mr. W. R. Walton of the U. S. Bureau of Entomology has stated in correspondence, and given permission to quote that, in the vicinity of Washington, D. C., "we frequently find considerable numbers of the Carolina grasshopper, *Dissosteira carolina* Linn., flying around the electric lights during the warm nights of the summer."

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1 Circular 36, 13th annual report, State Entomologist of Colorado, p. 35, June, 1922. Fort Collins, Colo.

2 Bulletin 293, U. S. Department of Agriculture, 1915, Washington, D. C.

3 Second Report, U. S. Entomological Commission, p. 97, 1880, Washington, D. C.

4 Bulletin 22, n. s., Div. of Ent., U.S.D.A., p. 106, 1900, Washington, D.C.

Rehn and Hebard [5], [6] have recorded the capture of the following species at light at night in New Mexico and Arizona:

Encoptolophus texensis Bruner [6], 1 ♀, Deming, N. M., July 20, 1917; Roswell, N. M., Aug., 1902.
Derotmema laticinctum Scudder [6], 1 ♂, Alamogordo, N. M., July 12, 1907.
Trimerotropis texana Bruner [6], 1 ♀, Alamogordo, N. M., July 12, 1907.
rubripes Rehn [6], 1 ♀ Alamogordo, N. M., July 12, 1907.
vinculata Scudder [6], Alamogordo, N. M., July 12, 1907.
vinculata Scudder [5], 1 ♂, Nogales, Ariz., Aug. 13.
fascicula McNeill [5], 1 ♀, Nogales, Ariz., Aug. 13.
strenua McNeill [5], 2 specs., Tucson, Ariz., July 26.
Aeoloplus arizonensis Scudder [5], 7 specs., Yuma, Ariz., July 27, 28.
Melanoplus herbaceus Bruner [6], 1 ♀, Alamogordo, N. M., July 12, 1907.

A study of these records indicates that night flying of Acridiidæ may frequently occur in the Southwestern United States, while nocturnal activity in this family would seem to be of rare occurrence in northern latitudes. It is, therefore, thought to be worth while to record the following observation made by the late Prof. A. L. Lovett of the Oregon Agricultural College and the writer, together with pertinent meteorological data.

On the night of July 22, 1923, Professor Lovett and the writer were in the city of Boise, Idaho, after a sweltering day on the train. At about 9:30 or 10 p. m., we decided to take a short stroll in the open air for the purpose of cooling off. Our attention was almost immediately attracted to grasshoppers which were fluttering around the street lamps like moths. Several of the grasshoppers were on the sidewalk where many had been stepped on and mangled by pedestrians and we each collected a double handful of the hoppers from in front of show windows and doorways. These grasshoppers have since been identified by the writer as follows:

Conozoa wallula Scudder, 3 ♀ ♀
Dissosteira spurcata Sauss., 6 ♂ ♂, 3 ♀ ♀
Spharagemon æquale Say, 5 ♂ ♂, 5 ♀ ♀

5 Proc. Acad. Nat. Sci. Phila. p. 365, 1908.
6 Proc. Acad. Nat. Sci. Phila., p. 111, 1909.

Clinton E. Norquest, Meteorologist of the Weather Bureau, U. S. Department of Agriculture, Boise, Idaho, has kindly furnished the following meteorological records for July 22, 1923:

Temperature	*Wind direction*	*Relative humidity* [7]
89° at 8 p.m.	W at 7 p.m.	25 per cent at 6 p.m.
86° at 9 p.m.	NW at 8 p.m.	
80° at 10 p.m.	N at 9 p.m.	
77° at 11 p.m.	N at 10 p.m.	
maximum for day, 98°	SE at 11 p.m.	

It is the opinion of the writer that the high night temperature was the principal factor occasioning the night flight of grasshoppers in this case, although the relative humidity, wind direction, and the extreme heat of the preceding daylight hours were doubtless also important factors. It is a well known fact that temperature is a prime factor in determining the activity of grasshoppers. Sviridenko [8] and Parker [9] have recently reported that air temperatures in the neighborhood of 80° F. occasion maximum activity in the case of *Dociostaurus maroccanus* Thnb. and *Camnula pellucida* Scudder, respectively. Parker [9] has recorded much valuable data on the relation of meteorological conditions to the behavior of the latter species. In this paper it is stated that migratory flights "did not begin (in Montana) until the air temperature had reached 74° F. and were at their maximum at from 75° F. to 78° F." Other data in the same article indicated that the temperature limiting the inauguration of short flights in Minnesota is near 75° F. Both authors agree that air temperatures in the neighborhood of 90° F. tend to inhibit activity in these species.

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[7] A trace of precipitation was recorded for the 23rd, so that the percentage of relative humidity was probably considerably higher at 10 p. m.

[8] Sviridenko, P. A. Petrograd, 1924, rev. in Rev. of Applied Ent., vol. 12, p. 337, 1924.

[9] Bulletin 214, U. of Minn. Agr. Exp. Sta., St. Paul, 1924, p. 32.

A NEW SPECIES OF PRISTOCEUTHOPHILUS FROM THE OLYMPIC MOUNTAINS, WASHINGTON.

(Orthoptera, Tettigoniidæ) [1]

BY THEODORE H. HUBBELL

Gainesville, Florida

The expedition to the Olympic Mountains of Washington, sent out in the summer of 1919 by the Museum of Zoology of the University of Michigan, brought back a small collection of the Orthoptera of the region. Only a few species are represented, as the party left the field before most of the Orthoptera had become mature. Nevertheless the collection contains several species of the subfamily Rhaphidophorinæ which are of unusual interest; one of these proved to be new, and is described below.

Pristoceuthophilus gaigei Hubbell n. sp.

Related to *P. tuberculatus* and *P. cercalis,* but easily distinguishable from all species of the genus hitherto described by the distinctive armament of the dorsum of the male abdomen, the form of the male cerci, and the coloration.

Description of holotype male

Size small for genus. Head with frontal spine well developed, but shorter and blunter than in *celatus* and *pacificus.* Antennæ slender, with approximately 120 segments, more than twice as long as body.

Pronotum slightly longer than exposed portions of meso- and metanota together. Ventral margins of thoracic terga gently arcuate, with ventro-cephalic and ventro-caudal angles rather abruptly rounded. Pronotum and mesonotum smooth; metanotum with a group of small, blunt-pointed tubercles on each side of dorsum, covering most of exposed lateral portions of tergum, but not reaching ventral border.

Terga of abdominal segments I to VIII armed with large, heavy, blunt-pointed spines, or with rounded or conical tubercles; dorsum of segment IV elevated into a large median prominence of distinctive form. Spines and tubercles of each abdominal segment arranged in two slightly irregular transverse rows along caudal margins of terga, except on VIII, where cephalic row is absent. On I to IV the spines (smallest on I) confined to lateral and dorso-lateral portions of terga; dorso-lateral spines largest (some measure .7 mm. in length), decreasing in size ventrad. Dorsum of segments

[1] Contribution from the Department of Biology, University of Florida.

I to III unarmed. Tergum of III narrower dorsally than the rest, crowded forward by enlarged dorsum of IV, which bears, in median line, a large, tall, smooth protuberance of peculiar shape (see figure) which is approximately three times as long as dorsal length of segment III. Segment V armed similarly to segments I to III, but caudal row of spines continued across dorsum (the dorsal spines being, however, much smaller than those of sides), and cephalic row represented on dorsum by paired lateral spines and a row of conical tubercles. Segment VI with same arrangement as V, but dorsal spines of both rows larger; spines of cephalic row irregularly spaced, and only about one-half the height of those of caudal row. Segment VII with spines of caudal row reduced to about half the size of corresponding ones of VI; cephalic row reduced to an indistinct line of rounded tubercles. Segment VIII with cephalic row absent; caudal row reduced to a line of rounded tubercles.

Pristocuthophilus gaigei Hubbell.
Dorsal view of abdomen of male holotype.[2]

On all abdominal segments except I the spines or tubercles of the caudal tend to be larger than those of the cephalic row; this is most marked in segments V to VIII, in the last of which no trace of the cephalic row remains. On segments II and III the armature almost reaches the ventral borders of the terga; posteriorly the distance to the ventral margin increases, until on VIII the tubercles are confined to the dorsum.

Supra-anal plate (tenth tergite) laterally narrow, with gently concave latero-caudal margins, produced mesially in a strongly depressed triangular lobe. Subgenital plate (hypandrium) subquadrate, narrowing distally; distal margin broadly and shallowly emarginate, disto-lateral angles rounded. Styles short, robust, bluntly pointed, with faint indications of segmentation. Penis fully extruded; ventral lobe sub-chitinous, densely clothed with fine retrorsoappressed spinules; longer than broad, with rounded tip (which hides distal portion of supra-anal plate in type).

Cerci similar in form to those of *cercalis* and *tuberculatus*. The length of cercus to tip of basal unsegmented portion about two-thirds the length of the pronotum.

Legs moderately stout. Cephalic femora unarmed. Median femora armed on both margins (left) or on caudal margin only (right) with a very minute sub-apical spinule. Median tibiæ armed dorsally with

2 The artist has correctly shown the main features of the abdominal specialization, but the figure contains some minor inaccuracies with regard to proportions and spine arrangement.

3-4 (left) and 3-2 (right) small, slender spines on cephalic and caudal margins respectively. Caudal femora slender, unarmed dorsally; both ventral carinæ armed in distal half with distant, minute, sharp-pointed spinules, more numerous and closely spaced on caudal than on cephalic margin, the apical ones larger than the rest. Hind tibiæ straight, with no trace of basal curvature or ventro-proximal lamination.

Length of antennæ approximately 21 mm.; of pronotum 2.6 mm.; of cephalic femora 3.4 mm.; of caudal femora 7.0 mm.; of caudal tibiæ 8.3 mm.; of cercus to tip of unsegmented basal portion 1.6 mm.

Coloration[3]: Antennæ honey yellow; joints of distal portion infuscated in proximal half; marked with lighter annuli at irregular intervals. Head barium yellow, with indistinct markings of vandyke brown below eyes and antennal sockets, and on median frontal line. Frontal spine black, the ocelli on its sides bright sulphur yellow. Eyes black. Occiput barium yellow, with markings of vandyke brown between eyes. Thorax barium yellow on dorsum, lighter and semi-translucent along ventral margin. Two broad brownish black dorso-lateral stripes border the light-colored median area. They are most distinct on caudal portion of pronotum and on mesonotum; on cephalic half of pronotum less densely colored, and marked with small yellowish maculations. Light median stripe abruptly narrowed in middle of pronotum by convergence of dark bands cephalad; from this angulation faint longitudinal streaks of vandyke brown extend caudad within margins of median band. Abdomen with dorsal surface ocher yellow, caudad faintly marked with longitudinal brownish lines; spines and median protuberance ochraceous tawny. The dark bands of thorax extend caudad less distinctly along sides of abdomen. Cerci barium yellow proximally, shading into reddish brown at distal end of unsegmented portion; terminal segment of distal portion barium yellow. Caudal femora honey yellow dorsally, indistinctly suffused with brownish on ventral surface; outer ventral carina marked with distinct alternating light and dark patches. Traces of color pattern similar to that of *cercalis* visible on pagina. Remaining femora and tibiæ honey yellow, faintly marked with brownish.

Specimens examined: One (holotype male), Lake Cushman, Olympic Mountains, Mason County, Washington, August 1, 1919 (F. M. Gaige). (In collection of Museum of Zoology, University of Michigan.) A single immature female taken June 25, 1919, in the same locality shows a similar type of coloration, and may belong to this species.

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[3] Where definite color names are used the terminology is that of Ridgway's Color Standards and Color Nomenclature.

Pristoceuthophilus gaigei is more bizarre than any species of the genus hitherto described, and one of the most peculiar of North American Orthoptera. It is most closely related to *P. tuberculatus* and *P. cercalis,* but far surpasses both of these species in degree of specialization of the male abdomen. All three species have the same form of male cercus, a more specialized type [4] than is found in other members of the genus. *P. tuberculatus* approaches closer to *gaigei* in the character of the male dorsal abdominal armament than does *cercalis.*

The function (if it has one) of the peculiar median prominence on the dorsum of the abdomen can only be surmised. It may be noted, however, that on the concave sides of the structure there are two elongate light-colored areas, which are connected across its dorsum at the narrowest point; these areas are not heavily chitinized, but seem to be membranous. It is possible that they may contain the openings of scent glands, or perhaps mark the site of an eversible scent organ.

I have named this species in honor of its collector, my friend, Mr. F. M. Gaige. His field notes on the type are as follows: "In rotten logs in clearing on Staircase Trail, Aug. 1." Mr. Gaige informs me that these logs were in an apparently natural clearing in maple-alder woods, with underbrush of stag-alder, vine-maple and willows, which bordered the dense conifer forest, the edge of which was about sixty yards distant. The altitude was approximately 1050 feet.

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4 These cerci are clearly of a more specialized type than the form normal in the Rhaphidophorinæ, but E. M. Walker (1922, Ann. Ent. Soc. Amer., xv, 19) suggests that the segmentation of the apical portion of the cercus in this group of species is an atavistic character.

NORTH AMERICAN SPHECOMYIA (DIPTERA, SYRPHIDÆ)

BY RAYMOND C. SHANNON
Bureau of Entomology

The species of the genus *Sphecomyia* are remarkable for their close resemblance to the yellow-jacket wasps, *Vespa*. The similarity of *S. vittata* is extraordinary, for even the antennæ are greatly elongated, being quite equal to those of wasps; while *pattoni* and *dyari*, which have small antennæ, have black and enlarged fore tarsi which are probably used to simulate long antennæ by extending them forewards. The species are apparently confined to the North American Pacific Coast region, except *vittata*, which appears to be of holarctic distribution.

TABLE OF SPECIES OF SPHECOMYIA LATREILLE

A1. Second, third, and fourth tergites each with a single yellow crossband, the posterior half of tergites black; fore legs mostly yellow; width of third antennal joint equal to length of first two (Ore., Wn., B. C.) ..... *nasica* Osborn

A2. Second, third, and fourth tergites each with a pair of yellow crossbands, sometimes partly fused.

B1. Fore tibia except base and fore tarsi black; arista much longer than antenna; mesonotum black.

C1. Scutellum yellow pilose; third vein moderately curved downward (Calif.) ..... *dyari*, n. sp.

C2. Scutellum black pilose; third vein practically straight (Ore., Ida.) ..... *pattoni* Williston

B2. Fore legs almost entirely yellow; mesonotum with yellow markings.

C1. Arista as long as antenna; mesonotum with lateral markings (B. C., Wn., Idaho) ..... *occidentalis* Osburn

C2. Arista much shorter than antenna; mesonotum with a pair of median, interrupted stripes.

D1. Antenna greatly elongated; arista about one-third the length of second joint (holarctic) ..... *vittata* Wiedemann

D2. Antenna moderately elongate, arista longer than second antennal joint (Calif. Ore., B. C.) ..... *brevicornis* Osten Sacken

Sphecomyia dyari Shannon, n. sp.

Female. Closely related to *pattoni*, but differs in a number of features as follows: General appearance noticeably more robust; head as broad as high (higher than broad in *pattoni*); antennal prominence less projecting; face slightly broader and

less excavated; antennæ more elongate, the third joint distinctly shorter than the first two, mesonotum more shining; two yellowish pollinose spots between the humeri; discal crossvein less oblique; third vein distinctly curved; yellow abdominal bands noticeably broader, the interrupted ones with their inner ends squared. Length, 15.5 mm.; wing, 13 mm.

Type-locality. Gold Lake Camp, Plumas County, California, July 19, 1916 (H. G. Dyar).

Type. Cat. No. 27,834, U. S. N. M.

Named for Dr. H. G. Dyar, who has added numerous Diptera to the National collection, taken during his countrywide searches for Culicidæ. This species may prove to be a race of *pattoni.*

A Useful Bibliography

Parshley, Howard M. Bibliography of the North American Hemiptera-Heteroptera. Smith College Fiftieth Anniversary Publication. Northampton, Mass. 252 pages.

Of the working tools of the systematic entomologist perhaps nothing has more value than a good bibliography. In the book cited above Dr. H. M. Parshley has given the hemipterist just such a help and has earned the sincere gratitude that will be fully accorded him. In addition to listing the works dealing with the systematic side of the subject he has wisely included papers on the biology of the group and many treating purely of the economic aspect of the subject. The names of the authors are arranged alphabetically, and under each author the titles are in chronological order, with a letter added, where necessary, so the Marks system of reference can be used if desired.

In the publication of my Catalogue of the Hemiptera of America North of Mexico, the very bulk of the volume made it advisable for me to omit most references to the biologic and economic literature included in the Henshaw Bibliography of Economic Entomology and its continuations, and all bibliography except the briefest possible reference to the serials and books whose abbreviations appeared in the pages of the catalogue. Dr. Parshley's Bibliography now supplies this omission very completely. No entomologist whose labors touch the Heteroptera at all can afford to be without this new bibliographical help.—E. P. Van Duzee.

ECONOMIC NOTES

BY E. O. ESSIG

University of California, Berkeley, California

European Earwig

Although the European earwig, *Forficula auricularia* (Linn.), has been known to occur in certain parts of the city of Berkeley for a number of years, the first real damage to growing plants came to the attention of the writer during the month of June of the current year. The injury consisted in the destruction of flowering buds of carnations in great numbers. The earwigs ascended the plants at night and ate out the bases of the bud, in most cases destroying them completely. The presence of the earwig is being watched with considerable concern, chiefly because of the damage reported to flowers and horticultural crops in Washington and Oregon. Inasmuch as the infestation has been generally limited to areas near the Bay, where little or no gardening is done, there has been no great opportunity for serious damage. As the pest spreads, however, to the residential districts, it is not unlikely that more serious injury will be reported.

The question of control and extermination has been discussed with the officials of the State Department of Agriculture. An agreement was reached a year ago, whereby an inspection of the Bay district was decided upon, but lack of funds and inspectors caused a delay in this procedure. Extermination is probably impossible, but it may be favorable to conduct a control campaign to prevent the spread of the insect throughout the State.—E. O. Essig.

Beet Army-Worm on Cotton

The beet army-worm, *Laphygma exigua* (Hübner) [*L. flavimaculata* (Harvey)], occurred in great numbers on several thousands of acres of cotton in the vicinity of Bakersfield during the month of May. Very serious damage was being done to the young cotton plants, many fields of which were entirely destroyed.

In addition to the beet army-worn there was also present in considerable numbers the yellow-striped army-worm, *Prodenia præfica* Grote, which was particularly abundant along ditch banks and roadways.

A conference of entomologists resulted in the recommendation of poison bran mash, which was first broadcasted and later drilled into the rows with seed drills. This material gave complete control, and the situation was cleared up almost immediately. Caterpillars were fed and adult moths reared which conformed in every way to the adults of the beet army-worm.—E. O. Essig.

The Currant Moth on Peanuts

Large shipments of peanuts infested with the currant moth, *Ephestia elutella* Hübner, were repeatedly received at the San Francisco port from China, during the fall of 1924. The outbreaks were checked by fumigation, but litigation involving hundreds of thousands of dollars grew out of the shipments. This is another instance of a questionable practice causing a heavy financial loss to both the shippers and carriers. The trade generally recognizes the danger of importing peanuts from the Orient during the late summer, and it is the ignoring of such well-founded customs, by those willing to take long chances, that leads to the destruction of good food and the introduction into this country of dangerous insects.—E. R. deOng.

The Alder Flea Beetle

The alder flea beetle, *Haltica bimarginata* Say, has been particularly abundant and destructive in various parts of Northern California this summer. Near Middletown, California, it defoliated all of the alders along the streams for a distance of ten miles.—Edwin C. Van Dyke.

The Monterey Cypress Bark-Beetle

The Monterey cypress bark-beetle, *Phlœosinus cupressi* Hopk., has heavily attacked, and practically killed, a number of Monterey cypresses on the University of California campus this last summer. Old cypress logs piled in the neighborhood enabled a large brood to develop which, with the beginning of spring, attacked the trees, those which were weakened by drought readily succumbing. This beetle is destructive only when large broods have been enabled to develop by allowing dead trees or timber to remain in the neighborhood of the living. —Edwin C. Van Dyke.

THE PAN-PACIFIC ENTOMOLOGIST

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E. P. Van Duzee, Editor F. E. Blaisdell, M. D., Treasurer

The annual affiliation meeting of the Pacific Coast Entomological Society was held at Portland, Oregon, June 17, 1925, in connection with the meetings of the Pacific Division of the A. A. A. S. In all, more than forty entomologists were in attendance at this meeting, which proved to be an exceptionally interesting one. There was a full program of papers, crowding the morning and afternoon sessions. This meeting was followed by a two days' meeting of the Western Division of the American Association of Economic Entomologists, which was equally well attended, with a full and interesting program.

A number of our entomologists from about the Bay region have been in the field this summer, and the net results will be a very considerable addition to our local collections. Dr. E. C. Van Dyke and E. P. Van Duzee spent the ten days before the Portland meetings, working along the Oregon coast from Waldport to Astoria, and after the meetings Dr. Van Dyke spent another two weeks working on Mt. Hood, Oregon, and Mt. Adams, Washington, and vicinity. Mr. C. L. Fox is spending a month collecting about Pullman, Washington, and Moscow, Idaho, and other nearby places. Dr. F. E. Blaisdell went by auto to Seattle, Washington, and Vancouver Island, and Professor G. F. Ferris is spending several months cruising along the Pacific Coast of Mexico and Central America, with a small party who will make many landings for field work in geology and entomology. Dr. Ernest H. Nast spent a month collecting neuropteroid insects in the Sierra, and Mr. J. O. Martin made a short excursion to the Coast about Arcata, California, after coleopterous material. The material taken by Mr. Van Duzee, Dr. Van Dyke, and much of that taken by Mr. Fox and others, will enrich the museum of the California Academy of Sciences.

Mr. A. J. Basinger of Riverside, California, has presented to the entomological department of the California Academy of Sciences a collection of over 2200 insects, including a very valuable and most welcome series of Alaskan Diptera.

Mr. H. H. Keifer, Assistant Curator of Entomology at the California Academy of Sciences, acting as entomologist on the Academy's Revillagigedos expedition, returned on June 12 with a fine lot of insects taken during the two months the expedition was in the field. This material is now being mounted, and a fuller report on it will be included in the next number of this Journal.

Mr. Walter M. Giffard of Honolulu has been a most welcome visitor at the California Academy of Sciences this summer. He and Mrs. Giffard spent two months in San Francisco, returning home on June 24. As is his custom when here, Mr. Giffard spent much time and effort advancing the interests of the entomological department of the Academy. Mr. F. X. Williams of Honolulu has also been spending some time in San Francisco and improving the opportunity to do some work on the Hymenoptera in the collection of the Academy of Sciences. Another welcome visitor at the Academy was Professor J. B. Parker of Washington, D. C., who spent a part of July working over the Bembicidæ in the Academy collection. Our local entomologists have also been favored with a brief visit by Mr. George P. Engelhardt of the Brooklyn Museum, who was making a hasty tour of the Pacific Coast region from Oregon to Arizona.

The recent death of Mr. Ralph E. Dodge of Exeter, California, is a real loss to Western entomology. Mr. Dodge was an enthusiastic collector of the Lepidoptera, his special interest being in the moths. He had been working in conjunction with his father, Mr. E. A. Dodge of Santa Cruz, California, in building up a collection of our California moths which was rapidly becoming one of the best in the State. Our Western entomologists will feel that their branch of science has sustained a serious loss in the death of young Mr. Dodge, and will unite in extending sympathy to the bereaved family.

Hypolimnas bolina Linn.